

**ATCAS II**  
**PROJECT INITIATION/PLANNING**  
**Part II – System Development Plan**

**Bay Area Toll Authority**



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**April 11, 2008**

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## 1.0 Overview

This System Development Plan is intended to provide follow-up comments and “straw-man” recommendations related to the topics discussed during at the ATCAS-II “wish list” meeting of Wednesday, February 27, 2008 and the subsequent planning meeting held on March 6, 2008.

Sections 2 through 8 of this System Development Plan set forth functional requirements, recommendations and scope. When converted to an RFP document, design requirements and performance requirements will be added. Sections 9 through 13 outline the specific aspects of a project management plan.

## 2.0 Approach

Due to the urgent need to replace the ATCAS system, project implementation will take place in two phases. Phase I will include software development and will be GAAP compliant, including the software capability to accommodate items targeted for Phase-II implementation. Phase I will also include the replacement or introduction of several hardware components. Phase II of the project will include items that are not urgently needed. Items targeted for Phase II will be indicated in the following sections.

## 3.0 Lane System

After obtaining BATA goals via stakeholder interviews, reviewing industry trends, and analyzing technology, it is determined that the BATA lanes system will need to be able to achieve the following:

FUNCTIONAL REQUIREMENTS	
1	Read Title-21 tags
2	Recognize hybrid as a tag type
3	Read hybrid tags in HOV lanes and charge patron accounts
4	Determine number of axles
5	Determine vehicle speed
6	Use proximity cards for toll collector log-in
7	Classify cash, non-revenue and other transaction types in mixed-mode lanes.
8	Buffer transactions
9	Operate in degraded mode
10	Operate in stand-alone mode
11	Send files to the Plaza and receive files from the Plaza
12	Operate lanes in Mixed, ETC, Maintenance and HOV modes
13	Synchronize lane mode and CMS
14	Provide feedback to patrons
15	Provide sturdy, adjustable collector screens and supporting arms
16	Provide heavy-duty cash drawers
17	Provide sturdy, weather-resistant cabinets
18	Provide easy access to toll booth cabinets for maintenance staff
19	Provide easy access to lane electronics, but only to authorized personnel
20	Utilize off-the-shelf receipt printers with standard size paper

FUNCTIONAL REQUIREMENTS	
21	License plate survey capability
22	Interface with VES system
23	The overarching design requirement will be to develop a smooth, fully-integrated system that accommodates staffed, dedicated, ORT, HOV and HOT lane modes.

### 3.1 Automatic Vehicle Identification (AVI) Technology

The current AVI system is Title 21 compliant and manufactured by SIRIT Inc. This system is comprised of vehicle-mounted FasTrak transponders, antennas mounted above the toll lanes and a reader controller card which can be used stand-alone or mounted in the lane controller, as currently used in the ATCAS.

Short Term Recommendation: Manufacturer (SIRIT) would perform a thorough evaluation of the current system, replace the reader control cards where necessary, and make other critical changes. This would (1) keep the existing system in service until replaced, and (2) refresh the equipment to the extent that SIRIT would be willing to support it during this interim period.

ATCAS-II Recommendation: (1) Install new Title-21 compliant reader/antenna system with the capability to read other types of tags, which may not be Title-21 compliant. . (2) Develop a test site by BATA to certify Title 21 equipment.

### 3.2 Hybrid Vehicles

Hybrid vehicles are currently handled outside of ATCAS by an auxiliary system.

ATCAS-II recommendation: Replace the auxiliary hybrid system with an integrated system. Install ETC equipment in all lanes, including HOV (and HOT) lanes. HOV lanes will be able to charge tolls during carpool hours. Hybrid vehicles will be able to be identified by tag type. Consideration should be given to installing a hybrid indicator light that would be visible to CHP.

### 3.3 Automatic Vehicle Classification (AVC) Technology

The technology for Automatic Vehicle Classification is divided into two sections: the first is for mixed lanes and dedicated FasTrak lanes; the second is for Open Road Tolling lanes.

#### 3.3.1 Mixed and Dedicated FasTrak Lanes

##### 3.3.1.1 Light Curtains

ATCAS-II recommendation: The current configuration of two pairs of light curtains (entry and exit) per lane will be maintained under the new system. In Phase I, the manufacturer (STI) will perform a detailed evaluation of the currently installed equipment and certify that current light curtains are and will remain functional and supported for the next three-four years. Light curtains will be tuned, adjusted or replaced in accordance with manufacturer's recommendations.

Installation of new light curtains will occur during Phase II.

### **3.3.1.2 Treadles**

ATCAS-II recommendation: TTI to continue to investigate possible alternatives to the existing treadle system in order to alleviate the current issues of poor drainage and frequent maintenance. Alternatives include piezo-electric strips as well as fiber treadles. If the existing system provides the best option for BATA, target drainage issues for mitigation and continue with existing solution with on-going maintenance program. Treadle replacement, if required, could occur in Phase II.

### **3.3.2 Open Road Tolling Lanes**

ORT lanes require different lane architecture than conventional lanes. In ORT lanes, traffic moves at highway speeds. In general, ORT equipment is mounted on overhead gantries or installed in the pavement so that no plaza structure or toll booths interfere with the free flow of traffic. Ideally, patrons experience no difference in speed or traffic as they pass the ORT tolling point.

ATCAS-II recommendation: The system will have ORT capability for up to 4 contiguous lanes and the Benicia Bridge ORT system will be replaced by the new ATCAS system. Proposers will be asked to describe their strategy for minimizing the future cost of converting some conventional lanes to ORT lanes. A strategy for the VES system in the ORT lanes at Benicia and future ORT lanes must be developed.

#### **3.3.2.1 Loops**

The existing lane system includes conventional entrance and exit loops that detect metal but are unable to classify vehicles. Although the loops would be available for use by the contractor, their use would not be mandatory. Rather, BATA would allow for contractor discretion in this area, with the understanding that BATA would not be responsible for loop accuracy.

Smart loops use inductive loops embedded in the roadway to detect the metallic mass of vehicles. Unlike conventional loop systems, which use a simple threshold to determine whether a vehicle is present over a loop, smart loops rely on software which processes the pattern of signal amplitudes from a combination of loops to determine not only the position of a vehicle, but also its type, speed, and number of axles. Rebar in the roadway can impair the accuracy of smart loops.

ATCAS-II recommendation: (1) Install smart loops in ORT lanes. (2) Do not install smart loops in conventional lanes due to the presence of rebar and the extensive civil work involved. Any lanes converted in the future may require demolition of plaza lane surfaces for optimum smart loop performance. (3) Use of the existing conventional loops would be at the contractor's discretion.

### **3.4 HOV Lanes**

All HOV lanes to include all functionality (reading tags, counting vehicles, detecting axles, calculating toll, recognizing hybrid vehicles, identifying violators and capturing images) except those performed by collector. During Phase I system should be able to count HOV vehicles and charge hybrids. During Phase II these lanes would essentially become ORT lanes with the addition of IDRIS loops and integration with the VES system.

### **3.5 HOT Lanes**

ATCAS-II should be designed, to the extent possible, to accommodate HOT lanes. ATCAS-II would be able to add new Plazas for HOT lanes. Consider modification to CSC files to include trip

details (to enable CSC representatives to respond to customer inquiries). Also consider a definition of “violation” that is not directly associated with tolling points.

### **3.6 Patron Toll Display (PTD)**

The Patron Toll Display manufactured by Daktronics is capable of displaying two lines of twelve alphanumeric characters each. It employs modern LED technology, has a low failure rate, is easily maintained and can be used for many more years.

ATCAS-II recommendation: Keep the existing patron toll displays unless they are unable to accommodate future needs (variable pricing) or the physical design changes to accommodate the violation indicator (see below). Message content for the PTD’s must be configurable at the Plaza or Host. If it is determined that new PTD’s should be installed, installation could take place in Phase II. Software changes necessary to accommodate new PTD’s to be developed in Phase I.

### **3.7 Violation Indicator Lights**

ATCAS-II recommendation: The new system should include a violation indicator light. During the RFP development phase decisions will need to be made regarding (1) the ideal location of the lights (preference would be to have the lights for CHP use and not visible to patron), (2) whether the indicator lights can be overridden and by whom (configurable on/off switch). Violation lights can be installed in Phase II. However, software to send the signal should be developed in Phase I.

### **3.8 Changeable Message Sign (CMS)**

Prior to ATCAS-II, the CMS’s, gates and lights will be coordinated.

ATCAS-II recommendation: The Lane Controller will interface with this newly-integrated CMS system to synchronize it with lane mode. As part of the RFP, the cases for lane mode, gate, light and CMS configuration should be carefully laid out in consultation with Toll Operations and Maintenance to ensure proper coordination.

### **3.9 Collector Booth**

The Booth-A cabinet in use today is a heavy-duty cabinet that houses electronics and integrates all collector peripherals. Under the proposed system configuration it will no longer be required.

ATCAS-II recommendation: (1) Replace the Booth A cabinets inside toll booth with new stainless steel storage units. Two units are required for each toll booth. One houses the electronics with a counter top to support the working cash drawer, receipt printer and prox card reader. The other is used to store personal items and cash overflow to minimize exposure in case of theft. New cabinetry should support multiple cash drawers. (2) Replace the heavy, mechanized, ergonomic arm with a light-weight but sturdy, manually adjustable arm to support the collector screens. (3) Replace the cash drawers with heavy-duty but manageable units. (4) Replace the toll collector screens with a model that does not freeze up under adverse weather conditions (sun, dampness). (5) Provide a stainless steel counter. (6) All equipment should be easy to clean and maintain. (6) Equipment cabinet should be easily removable.

BATA may consider developing these under a separate contract given that metal fabrication is not generally the forte of system integrators.

### 3.10 Proximity Cards

Proximity cards continue to grow in popularity because of the convenience they offer in security identification and access control applications.

ATCAS-II recommendation: (a) Replace swipe cards with proximity cards, using role-based privileges, for toll collector access to the new system. (b) Replace non-revenue patron passes with proximity cards. Cards would replace tickets and would continue to be issued at the plazas. Prox cards contain expiration dates and are maintained in a table which has the flexibility to allow free passage on a single facility or on multiple facilities.

### 3.11 Payment Methods

ATCAS-II recommendation: To the extent possible (and reasonable), ATCAS-II should be designed to accommodate future implementation of debit/credit cards and smart cards as toll payment methods.

### 3.12 Receipt Printer

ATCAS-II recommendation: Purchase off-the-shelf printers that use standard-size, readily available thermal sensitive paper.

### 3.13 Lane Controller

The lane controller is responsible for the integration of all lane devices and the logic for sequencing vehicles through the toll lanes.

ATCAS-II recommendation: Lane controllers should be replaced with new, off-the-shelf computers using a Linux-type operating system, RAID 5 drives and redundant components such as power supplies. For a number of reasons, including increased longevity, better safeguards, and easier maintenance it is recommended that the existing architecture of remote lane controllers be retained.

### 3.14 Test Site

ATCAS-II Recommendation: BATA is exploring the possibility of developing a local test site in the Bay Area. The multi-purpose test site: (1) would be used for testing during various project testing phases. Ideally the test site would accommodate both conventional and ORT lanes, (2) would function as a training site for toll collectors and other staff, (3) could be used to test change orders and upgrades prior to deployment; and (4) could serve as a Title-21 test facility.

Should a test site be constructed, contractor will be responsible to fully equip the site with AVI and AVC capability for both a conventional lane and an ORT lane, as well as a plaza and host computer. All testing detailed in a later section of this document, with the exception of the single-lane test, would take place at BATA's test site.

The following table provides an overview of the project scope for the lane equipment.



Lane Scope							
Item	Keep	Replace	Eliminate	Introduce	Evaluate	Later	Out of Scope
Tag reader system (readers, antennae)		X					
Light Curtains					X		
Treadles					X		
Treadle Frames	X						
Loops (conventional)					Contractor choice		
Smart Loops – future ORT lanes						X	
Smart Loops – Benicia ORT	X						
Zone Controllers – Benicia ORT		X					
Control Computer – Benicia ORT		X					
VES Cameras/LPR – Benicia ORT					X		
VES System							X
Patron Fare Display	X						
Violation indicator light				X			
Hybrid vehicle indicator light in HOV lanes				X			
Traffic Light							X
Changeable Message Sign							X
Gate							X
Booth A Cabinet		X					
Swipe card reader		Prox cards					
Prox Card Reader				X			
Collector Screen		X					
Cash Drawer		X					
Receipt Printer		X					
Credit/Debit card reader							X
Smart card reader							X
Buzzers							X
Lane Controller		X					
Manual Mode			X				
Power Supply					X		
Test facility (also used for training and Title 21)				X equipment			

## 4.0 System Architecture

FUNCTIONAL REQUIREMENTS	
1	Process toll transactions in real time 24/7
2	Transactions to have proper accounting cutoff
3	Send all electronic transactions to the CSC
4	Securely interface with CSC and Bank
5	Store all transaction data for seven years. Consider archiving and/or limiting access to older data to the data warehouse.
6	Failover to proper alternate server in the event of a server failure
7	Back up to tape

FUNCTIONAL REQUIREMENTS	
8	Allow browser-based and timely access to all functionality
9	Perform Plaza level functions
10	Perform Host level financial and reporting functions
11	Report failures in all system devices
12	Flexible to the addition of more lanes and lane types, plazas, transaction types, fare structure changes, and changes to lane message configurations.
13	Flexible to accommodate for congestion pricing

#### 4.1 Network

BATA is undertaking a program to upgrade its toll network from a hub and spoke system to one in which all the plazas and the host are interconnected. This upgrade will essentially remove the risk that network connection disruptions will interrupt toll system operations.

ATCAS II recommendation: No work needs to be undertaken on the network as part of this procurement. However, detailed network and connection requirements (such as DNS, static IP addresses) should be included in the RFP.

#### 4.2 Architecture

As the current ATCAS has aged, failures of individual components of the system have led to increasing burdens on BATA personnel. Since the ability to modify ATCAS is restricted, numerous workarounds have been devised. The new system must incorporate the many other systems that have been built around the current ATCAS as well as support new functionality and new interfaces as they come along.

##### ATCAS II recommendations:

- Appendix "A" contains a series of diagrams outlining the recommended architecture for the new ATCAS system. These are preliminary, conceptual diagrams that will be specified in more detail in the RFP. Final detailed architecture will be determined in dialogue with the new vendor.
- The standard 3 tiers of lane, plaza and host should be maintained. However, little functionality and data storage will be maintained at the plaza level with most of the current functions being moved to the host.
- The plazas will be developed to accept transactions from mixed mode, dedicated mode, ORT and HOV lanes.
- The host will be able to accept new plazas should they be necessary to handle HOT lanes (or other systems).
- A new interface server will be developed that can handle detailed transaction files as well as batched electronic files. The image storage servers which are currently part of the VES procurement will no longer be used. This functionality will be put into the interface server and database in the new ATCAS. Existing utility servers including ftp and mail servers will be integrated into the new system.

### 4.3 Host Structure

The new system should be more robust against failures and yet easy to maintain. The new application software will be determined as to whether it is off the shelf software or design build. It needs to be robust enough to fulfill the business and operational requirements and produce summary information. It needs to be flexible enough to add new plazas and their additional transaction volume.

ATCAS II recommendation: BATA IT has suggested a sophisticated host architecture with two sets of clustered application servers, one for the normal host functions and one for processing and storing violation images and interfacing with the CSC. These clusters will connect to a database farm, which in turn will connect to a Storage Area Network (SAN). Along with the upgraded network described in the previous section, the clustered servers, off-site backup and secure data storage of the SAN ensure that the new ATCAS will be available 24/7 in almost any circumstance. The servers must be sized for real time processing and 10 year storage of all data. The database servers will also house a data warehouse.

In the procurement the clustered architecture and SAN will be required. However, the other details of the architecture will be presented as “strongly preferred” so as not to restrict potential vendors too severely and to limit the risk from developers attempting to implement architecture with which they are unfamiliar. However, while proposers may offer comparable alternatives, any proposal would need to address how its proposed architecture would meet the performance, availability and maintainability standards BATA requires for its Host.

### 4.4 Plaza Structure

Currently plaza servers are the central repositories of detailed transaction data and some of these data are summarized and transmitted to the host server. . It needs to be determined how these detail data and redundancy can be maintained in the new system. The servers themselves are old and need replacement.

ATCAS II recommendation: Replace plaza servers with separate application and database servers and integrate them more completely with the HOST. The plaza will send all transaction data gathered from its lanes to the HOST and only store 2 months of transaction data to act as a buffer in the event of HOST or communication failure. Plaza architecture must be robust to distance from the lanes so that in the event that HOT lanes are included in the system, their plazas could be located at a large distance from the actual lanes.

VES plaza servers will be part of the current VES replacement project making them out of the scope of this ATCAS replacement project.

As in the case of the Host servers, the procurement should recommend but not require a specific plaza architecture so as not to restrict potential vendors too severely and to limit the risk from developers attempting to implement an architecture with which they are unfamiliar. However, any proposal would need to address how its proposed architecture would meet the performance, availability and maintainability standards BATA requires for its Plazas.

#### **4.6 Disaster Recovery**

BATA is currently placing a failover server at Benicia Plaza in addition to the back up tape system.

##### ATCAS II recommendation:

Lane Level: No failover required. Today's lane controllers rarely experience hardware failures and can generally be put back into service quickly with a restart should an application error occur. They will store data for up to a month if communication with the plaza fails.

Plaza Level: The failover for the plazas should be the host application servers. The host application servers should have the plaza application loaded and set up as the failover in the event that the plaza server fails.

Host Level: Offsite failover application, database, and interface servers will be maintained. The failover database will only contain sufficient data to keep the system operating during the course of an emergency. A failover ftp server for communication with the CSC will also be required. In addition, a nightly tape backup will ensure that data can be restored if the SAN fails.

#### **4.7 Data Conversion**

Conversion of detailed transaction information to the new production database will not be a requirement of ATCAS-II. However, a data warehouse will be established as part of ATCAS-II. Transfer of summary ATCAS-I data to the data warehouse in a format that will allow for reports to be generated that pull from both historic ATCAS-I data and new ATCAS-II data will be a requirement. The data warehouse should be established in Phase I.

#### **4.8 Access Control**

A single logon and password should grant those with permission entry into either the Host or Plaza applications. The user should be able to move seamlessly between those applications as if they all occupied the same server.

Permissions in the system should be role-based and the RFP development should include careful consideration of a user rights table. In addition, a system administrator should be able to override the role-based rights and grant or revoke rights for any given individual.

The RFP should express a preference for a pre-existing access control system rather than one custom built by the vendor for ATCAS-II.

System Architecture Scope							
Item	Keep	Update	Eliminate	Introduce	Evaluate	Later	Out of Scope
Network							X
Lane/Plaza/Host Structure		X					
Web based				X			
Host Servers		X					
CSC Interface Servers		X					
Separate Database Servers				X			
Storage Area Network				X			
CSC Interface Drop Box	X						
VES Plaza Servers							X
Plaza failover to Host				X			
Offsite Failover Host and Interface Servers		X					
DMV Server	X						
Bank Drop box	X						
Data Warehouse				x			
Migrate summary data from ATCAS-I to ATCAS-II data warehouse				x			
Access Control				x			

## 5.0 Plaza and Host Systems

### 5.1 Toll Supervisor

Below is a preliminary list of functional requirements. Requirements will be further refined and defined during the RFP development process.

FUNCTIONAL REQUIREMENTS	
	<b>Lane Controls</b>
1	Monitor traffic
2	Monitor individual lanes
3	Monitor individual collectors
4	Change lane mode remotely
5	Remotely open a lane
6	Remotely close a lane
7	Configure carpool hours and override end time
8	Configure fare tables and schedule for time-of-day pricing
9	Configure formulas for congestion pricing and override
	<b>Toll Administration</b>
10	Issue passes (prox cards) for non-revenue vehicles
11	Maintain database of non-revenue passes
12	Manage secure log-on for toll collectors
13	Maintain database of toll collectors and maintenance personnel

FUNCTIONAL REQUIREMENTS	
14	Maintain daily log (report unusual occurrences)
	<b>Bridge Fund Processing</b>
15	Manage bridge funds (Initial deposit, increase, or decrease)
16	View the bridge funds
17	Issue change funds to Collectors/Sergeant's Desk
18	Audit the change fund
19	Track change funds returned by Collectors/Sergeant's Desk
20	Process patron claims
21	Issue refunds
22	Retrieve patron refund records
23	Process bridge refunds
24	Monitor the Sergeant Desk change fund
25	Start the Sergeant Desk change fund
26	End the Sergeant Desk change fund
	<b>Collector Performance</b>
27	Monitor cash counting process
28	Provide registration report after collector's shift
29	Deposit cash in vault
30	Sign off an open tour
31	Review business day activity
32	Audit a collector's shift
33	Track history of collector cash variances
	<b>Generate Reports (see Reports Section)</b>
34	<b>Sergeants' Logs</b>
35	<b>Plaza Incident Report</b>

ATCAS-II Recommendation:

The Plaza system will include new screens and reports as well as the following:

- configurable tables for carpool hours, holidays, fare tables, time-of-day pricing and congestion pricing;
- user-friendly reporting and printing;
- non-revenue proximity cards in place of non-revenue passes

Toll Office Scope							
Item	Keep	Update	Eliminate	Introduce	Evaluate	Later	Out of Scope
Computer workstations (Toll Office & money drop)		x					
Printers							x
Non-Revenue Tickets			x				
Non-Revenue Prox Cards				x			
Reports		x					
Monitoring Screens (software)		x					

## 5.2 Finance – Audit

	FUNCTIONAL REQUIREMENTS
1	Record and account for all revenue and non-revenue transactions accurately.
2	Calculate, summarize, and report all registration and toll revenues accurately.
3	Summarize and report daily transactions and toll revenues by tours, shift, collector, lanes, and bridge plaza.
4	Summarize daily bridge reports by month and by bridge. Report monthly bridge revenue and traffic counts.
5	Reconcile AVC registration with collector's registration.
6	Reconcile axle counts with collector's registration.
7	Track collector performance over a period of time (collector performance history).
8	Transfer ETC and violation data to ETC/CSC center for processing.
9	Summarize and reconcile the daily ETC and violation transactions transferred to the CSC and posting of the revenue.
10	Accept ETC/CSC center inputs for reconciliation of ETC revenues.
11	Transmit deposit information to bank and incorporate bank inputs into the reconciliation.
12	Retrieve reports in a timely manner.
13	Consistency between report data.
14	Maintain and identify audit trails for the reported information.
15	Incorporate accounting internal controls within the design of the system to ensure accountability and accuracy. Identify control features within the system design.
16	Provide access to detail transactions.
17	Ability to independently verify and reconcile the electronic toll transactions.
18	Capable of producing ad hoc reports.
19	Capable of exporting production file to Excel.
20	Download ATCAS lane transactions (cash and ETC tolls). Prepare daily report which reconcile daily axle counts, vehicle classifications with total revenues by bridge.
21	Perform allocation calculation using a reference table/parameters that are configurable to distribute revenue to various funds. Manually approve for daily transmission into the current accounting system (IFAS).
22	Consolidate daily axle counts, vehicle classifications and revenues to monthly reports by bridge.
23	Communicate via a network with bridges to get real time information.
24	Observe live traffic (feed) from BATA offices for all seven bridges.
25	Get consolidated information for all seven bridges.

	FUNCTIONAL REQUIREMENTS
26	Run real time reports without business day being closed.
27	On-line access to bridge logs and incident reports.
28	Report missing vehicle sequence number for transactions.
29	Submit nightly reports when business day is closed.
30	Determine when all files are transmitted from lanes to the plaza and plaza to the host.
31	Determine when the business day is closed with all activities. Ensure all transactions for the business day are accounted for within the daily audit report.

Finance-Audit Scope							
Item	Keep	Update	Eliminate	Introduce	Evaluate	Later	Out of Scope
Computers							X
Printers							X
Detailed ETC transaction reconciliation				X			
Detailed violation transaction reconciliation				X			
Interface to Bank		replicate					
Interface to IFAS					X		
Interface to CSC		modify					

### 5.3 Events and Alarms

Events and alarms help users to monitor the health of the system and to send timely notifications of potential system problems to maintenance staff and other interested parties.

FUNCTIONAL REQUIREMENTS
Toll system to report a defined set of lane events
Toll system to generate alarms for defined set of lane, plaza and host conditions
Alarms to be assigned priorities
Alarms to be communicated to designated persons via email and cell phone
Alarms and events able to be monitored using plaza screens
Alarms able to be searched based on plaza, date, lane, type and other selection criteria
Authorized maintenance, finance, audit, toll office and management (and possibly CSC) staff to be able to view and research alarms and events
Staff to be able to view violation images captured in each lane at each plaza
Acknowledge and resolve alarms

Below is a preliminary list of alarms. It is not intended to be an exhaustive list, but rather to present a sampling of alarms that the system will be required to generate.

- No signal from lane controller
- Any peripheral not operational
- Printer paper low, out, jammed
- Unknown axles
- Text inserter not operational



- UPS battery on
- UPS battery low
- Unable to start an application
- Excess violations
- Disk space low
- Logging failure
- Unable to create file
- Unable to process file
- File late or missing
- Database failure
- Manual alarms

## Alarms and Events Scope

Item	Keep	Update	Eliminate	Introduce	Evaluate	Later	Out of Scope
Inventory Control							x
Alarm generation		x					
Alarm notification		x					
Event generation		x					
Event and Alarm Reports		x					
Monitoring Events and Alarms		x					
Searching Events and Alarms				x			
Monitor violation images		x					Move from VES

## 5.4 Reports and Screens – Plaza and Host

	FUNCTIONAL REQUIREMENTS
1	Reports to follow good accounting principles and be GAAP compliant.
2	User-friendly (i.e. accept multiple date formats, drop-down menus)
3	Fast load time
4	Real time or near real time access to specific screens and reports
5	Robust data analysis capability
6	Can be selected for user-specified time periods
7	Can be selected for individual plazas
8	Uniform use of terminology throughout all reports
9	Consistency of data from one report to another
10	Once a business day is closed it is not reopened
11	Host-level reports summarizing plaza activity
12	Ability to reconcile from Lane to Plaza to Host to CSC and back
13	Attractive layout both on screen and on printed versions
14	Exportable to Excel and Access
15	Tools for researching discrepancies and performing ad-hoc queries

ATCAS-II Recommendation: (a) Routine reports used by the various departments will be defined in the RFP. This will maximize the potential for efficiency and speed for standard production reports; (b) Staff will have the ability to request ad-hoc reports for non-routine inquiries; more extensive queries will be performed by IT personnel; (c) Reports will be assigned priorities so that all essential reports are ready by go-live and less essential reports could be delivered post go-live. (d) Reports will be grouped by functionality and access to reports will be granted through a permissions-driven table.

Reports definition will take place during the RFP development phase. Below are categories of screens and reports that will be refined.

	<b>Screens/Reports Scope</b>
	<b>Item</b>
1	Hourly Vehicle Registration Summary Traffic reports (ETC, cash, non revenue, violations; vehicles by axle counts. Traffic by day, hour, and other time intervals
2	Revenue and non-revenue reports (daily and monthly)
3	Combined traffic and revenue (mixed, dedicated mode, HOV, Non Rev, Interop)
4	Hybrid Transactions Report
5	ORT reports
6	Collector Cash Summary Report – from plaza
7	Collector Cash Detail Report – from plaza
8	Transaction Detail Report
9	Transaction Tour Report filtered by (cancelled ETC, class axle mismatch, buffered, etc)
10	Collector Tour Summary Report
11	Collector Shift Detail Report
12	New Collector Shift Report (with more detail than original Collector Shift Report)
13	Lane Summary Report
14	New Lane Summary Report (with more detail than original Lane Summary Report)
15	Plaza Summary Report
16	New Plaza Summary Report (with more detail than original Plaza Summary Report)
17	ETC Interop Summary – from plaza
18	ETC Interop Detail – from plaza
19	Registered Cash FTP to Bank Report
20	Collection Record Recap Report by bridge
21	Daily Cash Report
22	Host Collector Shift Summary Report
23	Daily Bridge Reconciliation Summary Report
24	Monthly Bridge Reconciliation Summary Report
25	ETC Interop – Plaza Summary and Detail Reports – from host
26	ETC Interop – Daily Transaction Detail Report – from host
27	All Bridges Registered Traffic Count (Cash and ETC)
28	Audit Tickler
29	Track Collector performance history
30	File transfer reconciliation
31	Revenue day reconciliation
32	Revenue day to CSC posting day reconciliation
33	CTOC reports
34	Violation Reports (by lane, hour, plaza) and violation revenue
35	Exception Reports - Duplicate sequence numbers, missing sequence numbers
36	Bank reports
37	Accounting reports

## 6.0 Surveillance System

FUNCTIONAL REQUIREMENTS
Ability to monitor activity in toll booth
Ability to monitor activity in lane
Insert text transaction detail on video
Provide search capability
Provide adequate storage

ATCAS-II Recommendation: The system budgeted for ATCAS II stores video for 3 months and users can search video at each plaza by lane and by time. Centralized access, access by transaction information and longer storage are all possible at a higher cost.

Surveillance Scope							
Item	Keep	Update	Eliminate	Introduce	Evaluate	Later	Out of Scope
VTDM			x				
3 cameras per staffed lane (49)				x			
1 camera per dedicated lane (24) to replace VTDM				x			
Search engine				x			

## 7.0 Interfaces (VES, Vector, IFAS, Bank, CMS, DMV, CHP)

Violation Enforcement System (VES)	
Requirement	Impact on VES
View violation images	No impact foreseen
ATCAS II – VES interface	ATCAS-II vendor to work with VES vendor (TRMI) to define and develop the interface.
License Plate Survey	Regardless of survey method, a modification to VES would be required. Could modify VES to capture OCR for every vehicle. Could modify VES to accept additional message from ATCAS to capture OCR and/or capture image of “x” type of transactions for “x” period of time.

Customer Service Center Software (VECTOR)	
Requirement	Impact on VECTOR
Hybrid tag type	Modify CSC tag file specification
Detailed transaction reconciliation	Modify CSC response files specification
HOT lanes	Modify ETC file to include trip details. Consider modifying violation definition to be independent of tolling points.

Business day 12:00 – 11:59:59	Change business day definition
Transition (depending on BATA strategy)	Modify Vector to communicate with two hosts during transition

IFAS
Prepare report for ease of data entry into IFAS and evaluate automating the transfer.

Bank
ATCAS-II will replicate the existing bank interface.

Changeable Message Sign (CMS)	
Requirement	Impact on CMS
Synchronize CMS with lane mode	ATCAS-II to include an interface to Ver-Mac Centralo System. (Synchronization of CMS to light and arm will happen prior to ATCAS-II.)

DMV
DMV look-up interface outside scope of ATCAS-II.

CHP
ATCAS-II to include equipping CHP vehicles to enable them to read Title-21 compliant transponders and determine tag status (valid, invalid, lost, stolen) and type (hybrid). This item to be implemented at BATA's discretion and priced as an optional item.

## 8.0 Warranty and Maintenance

Vendor to be responsible for all aspects of system hardware, software and maintenance (including system administration, database administration and application support) of the ATCAS-II system once any portion of the system is in use for the general public. This is the period prior to the start of the formal warranty (final system acceptance).

The formal warranty period will begin upon final system acceptance and extend for a nine month period. Contractor will continue to take full responsibility for all aspects of the system, including tuning and optimizing.

The formal warranty period will be followed by a 3-year maintenance contract with two 2-year optional extensions that can be exercised at BATA's discretion.

## 9.0 Schedule

See Appendix "B". The schedule is a base line schedule that does include either accelerated implementation or late-delivery of items.

## 10.0 Procurement Plan

This procurement plan was developed after reviewing toll system procurement plans in the Bay Area (ACCMA, Golden Gate Bridge), recent toll system procurements by public agencies in other parts of the country, and recent BATA toll-related procurements.

### 10.1 Procurement Schedule

The following schedule strives to expedite the procurement process, yet allow for both a thoughtful, well-constructed RFP and comprehensive, well-conceived, competitive responses. This schedule allows for negotiations with proposers in lieu of a formal BAFO process.

ACTIVITY	DATE(S)
RFP Development	04/01/08 – 06/30/08
RFP Release	07/17/08
Proposers' Conference and Site Visit	08/05/08
Closing date for questions, requests for clarification and requests for exceptions or modifications to RFP provisions.	08/12/08
Addendum Issued	08/19/08
Proposals Due	09/23/08
Oral Interviews (if any)	10/14/08 – 10/15/08
Recommend Award to BATA Oversight Committee	11/12/08
Execution of Contract	12/01/08

### 10.2 Minimum Qualifications

It is recommended that the RFP contain some minimum standards that proposers must meet in order to eligible for consideration. These standards should include:

- License to do business in the State of California and current certifications, licenses and registrations required to implement the project
- Experience working with public agencies using electronic toll collections systems
- The company and/or the majority of staff responsible for the account must have direct experience in the development, installation and support of at least three electronic toll collection systems within the past ten years.

### 10.3 Evaluation Panel

An evaluation panel should be appointed whose members are familiar with financial system implementations, installation of lane equipment and have experience evaluating vendor proposals and conducting oral interviews. In addition, it is recommended that technical consultants (who are not part of the evaluation committee) provide specialized advice to support panel members.

### 10.4 Weighting

A description of evaluation factors listed in descending order of importance in the RFP is recommended.

## 10.5 Scoring

It is recommended that the evaluation panel be given scoring sheets with a listing of key items to be considered in each scoring category. This tool can serve to foster objectivity during review of proposals. Independent, initial scoring by each panel member can help prevent peer pressure and "group think".

## 12.0 Quality Control

The most effective method of ensuring overall quality is to clearly specify standards of quality in the RFP (contract). The performance requirements should be **quantifiable and measurable**. If the RFP specifications are weak, it is extremely difficult to control quality downstream.

The following quality measures will be specified in the RFP documents:

### 12.1 Accuracy

- System Accuracy Conditions (system capacity, traffic patterns and vehicle types; vehicle speeds; transaction types; lane configurations)
- System Accuracy Criteria (criteria for meeting accuracy standard)
- System Accuracy Exceptions (improperly mounted tag etc.)
- System Accuracy Measurement (data collection; statistical methods; standards for conformance)

### 12.2 Availability

- Availability, Reliability, Maintainability and System Life
  - No single point of failure
  - Minimum time between failures of any lane
  - Maximum time to repair/replace
  - System life expectancy
- Availability Test
  - Lane (lane controller, AVC, AVI, collector terminal)
  - Plaza (auditing, tag status update to lanes; lane transaction retrieval and processing; lane image retrieval and processing; supervisor display and alarms, communications to/from CSC)














### 12.3 Security

- Access Security
  - Passwords – User IDs (or other method)
  - Read access – write access
  - Security for remote access
- Data Security (file transfer)
- Physical Security (tamper-proof cabinets)
- Support (hardware and/or software maintenance)
- Contractor Responsibility

## 12.4 Project Management

Once the project is underway, quality will be controlled through various project management tools including:

- Detailed Project Schedule (MS Project)
- Clearly defined roles and responsibilities
- Communications plan
  - Contact list
  - Agenda preparation, meeting facilitation and minutes responsibility
  - Progress tracking
  - Phone and web conferencing
  - Issue Tracking
  - Open Items list
  - Document control
- Defined deliverables with due dates (including vendor QA/QC plan)
- Requirements document (developed from RFP and tracked throughout project)
- Prompt review of deliverables
- Thorough and timely testing

Quality Control		
<b>Phase I</b> <b><i>RFP</i></b> <b><i>Specifications</i></b>	<b>Phase II</b> <b><i>Design</i></b> <b><i>and Development</i></b>	<b>Phase III</b> <b><i>Testing</i></b> <b><i>and Implementation</i></b>
 Specify measurable performance standards	 Develop and adhere to communications plan	 Observe functional demonstrations early in project
 Include accuracy criteria, conditions, exceptions and means of measurement	 Maintain detailed project schedule with linked dependencies	 Attend formal factory testing
 Enumerate standards for availability, reliability, maintainability and system life	 Promptly review design documents, test plans and other deliverables	 Develop a local test site for testing and training
 Require access control, data security and physical security	 Continuously monitor and track all contract requirements	 Require early development of interfaces
		 Allow ample time for single lane test to avoid hasty rollout

## 13.0 Risk Control



**13.1 Agency Rights:** As with quality control, risk control begins with the RFP and contract documents. Clear language that guarantees agency rights to software and data, and protects from vendor negligence is essential. Risk can also be mitigated somewhat through conservative progress payments, ensuring that the Agency retains enough of the contract funds (hence, incentives) for the contractor to perform well.

**13.2 Vendor Selection:** The RFP should be crafted to elicit the information necessary to make informed decisions about vendor qualifications and vendor suitability for the project. The evaluation panel should be carefully selected and should be diligent in reviewing proposals. Follow-up questions and oral interviews should be used to probe for any potential risks to the ultimate success of the project.

**13.3 Schedule:** Care should be taken in requirements gathering and definition to avoid scope creep that will result in implementation delays. The project schedule should be detailed and realistic and kept in the forefront of consciousness throughout the project. The schedule should be designed for efficiency, with priorities assigned to essential functions. In the event of delays or urgencies, non-essential functions could be implemented post go-live. Payments should be tied to deliverables and provide performance incentives.

**13.4 Design:** The System Design Document should be developed as early in the project as possible. This design should be reviewed for functionality. The quality and accuracy of this document is vital to project success.

**13.5 Testing:** Demos of key functionality, scheduled as early as possible during the design stage, can avert a myriad of problems later in the project. [See Section 13.0 for additional testing discussion]

**13.6 Installation:** A lane conversion and transition plan should be developed that does not impede traffic flow, provides safety to toll personnel as well as facility patrons and provides a minimal amount of revenue loss. The contract documents should specify that the vendor must coordinate all lane activity with toll management and audit. In some instances lane activity could be limited to certain hours of the day. Contract documents should also require conformance with industry safety measures. It should be anticipated that two systems will be maintained until all lanes have been converted.

Comprehensive testing should take place at the test site, including testing of the modifications to the ORT system. Nonetheless, no matter how thorough the testing, installation is complicated by the complexity of the “real-world” environment. A comprehensive “single-lane” test should be conducted in both a mixed mode lane and a dedicated lane before rollout begins. Rushing this phase of the project can pose both operational and financial risks.

**13.7 Training:** A comprehensive training program for all system users will mitigate risks during implementation, operations and maintenance. Training should involve classroom sessions, user manuals and on-the-job training.

**13.8 Software and Documentation:** Disciplined software version control practices should be adhered to. The integrator should be required to deliver all documentation, system design manuals, operating manuals and software code prior to system acceptance. Data back-up regimens should be established and kept. There should be a periodic review of the disaster recovery plan.

